Integrated Electronic Warfare Self-Protection Solutions for all Types of Aircraft

TERMA

ALLIES IN INNOVATION

Terma EW Control and Integration – in a Class of its Own

EIGHT GOOD REASONS TO SELECT THE TERMA SOLUTION

- Terma has over 20 years of experience as a leading integrator of EW systems. Terma's AN/ALQ-213(V) Electronic Warfare Management System is operational and combat proven on more than 2,000 fighters, helicopters, and transport aircraft worldwide.
- The ALQ-213 has achieved a position as the only system in the market that is independent of platform or subsystems suppliers and is able to control and integrate any combination of sensors and countermeasures systems on any type of aircraft and make these work as one system.
- Terma is the only integrator that includes the structural packaging in the total solution, typically in the form of Terma designed pods, pylons, or other fixtures that allow rotation of systems within the fleet. This approach reduces the cost of aircraft modifications and allows for fewer systems overall.
- Terma provides combat proven, automatic threat response through Electronic Combat Adaptive Processing and offers multinationally tested Embedded Training so pilots can truthfully say "We train as we fight".
- Pilot-Vehicle-Interface is the most advanced in the market with separate, full color threat display or glass cockpit integration, 3D-Audio Warning of attack, Active Noise Reduction, and radio channel separation.
- Terma has a proven record of developing, qualifying, and delivering complete custom-tailored self-protection installations within 3-6 months utilizing our fast responding organization and unique modular product portfolio.
- All EW suites are offered with advanced Mission Support tools and full organic and logistics support. Mission Support tools can be operated stand-alone or integrated with common mission programming and debriefing system tools for multi-player training.
- Terma's EW controller is the only solution offering commonality and common software across the aircraft fleet.

ALQ-213, the World's Most Widely Used EW Control and Integration System

The AN/ALQ-213(V) Electronic Warfare Management System dates back to 1991, when the first version was installed in the Danish F-16s to better coordinate onboard EW self-protection systems and to reduce the pilot's workload. Since then, it has been continually improved and upgraded. Today, it has become the most versatile system of its kind, being operational on over 2,000 fighters, transport aircraft, and helicopters worldwide. Over the years, it has proved its value in actual combat such as Bosnia, Iraq, Afghanistan, and Libya.

This versatility is achieved through a comprehensive set of system components that can be combined and programmed to meet the requirements of any type of mission or type and size of aircraft.

A UNIQUE SYSTEM OF ITS KIND

Compared to similar systems, the ALQ-213 is unique in the following ways:

- It is the only system that is independently based on open architecture and provides a firewall between the sensor system and the aircraft avionics system. This allows for addition of subsystems and sensor updates that are transparent to the aircraft, are less certification intense, and less costly.
- Unlike many other systems, the ALQ-213 is not locked to a specific platform or EW subsystem.
- The ALQ-213 is the only system that provides flexible integration of multiple combinations of sensors and countermeasures systems: UV, IR, LASER, Acoustic, RF, Chaff/Flare, DIRCM, Towed Decoy, and Jammers.

ALQ-213 COMPONENTS

EW MANAGEMENT UNIT

TACTICAL DATA UNIT

The combination of the EW Management Unit, EWMU, and the Tactical Data Unit, TDU, is the most widely used configuration. The EWMU is the cockpit control unit which feeds data to the threat display and the 3D-Audio system and facilitates loading/unloading and recording of mission data through a dual PCM cartridge.

DEFENSIVE AIDS CONTROLLER

REMOTE CONTROL PANEL

The DAC, Defensive Aids Controller, is well suited for larger aircraft and helicopters. It combines the functionalities of the EWMU and TDU and also includes a Programmable Interference Blanker Unit, PIBU. Since the DAC is placed in the electronics bay, it requires a remote control Panel RCP for cockpit control, recording, and loading/unloading of mission data. A smaller version, "Mini DAC", is under development in order to meet the requirement for smaller and medium-sized aircraft without the need for blanking and other kinds of expansion.

LIGHT AIRCRAFT SURVIVABILITY EQUIPMENT

For very light aircraft and helicopters, where weight is a special concern, a LASE controller is under development. This controller is a derivative of the Advanced Threat Display, and it will be able to control a subset of threat sensors and automatically dispense countermeasures payloads.

ADVANCED THREAT DISPLAY

F-16

OTHER A/C

Full color, multifunction display that gives the pilot complete information about the threat and the status of onboard EW systems. In glass cockpit aircraft, this information can be presented on existing displays.

Revolution in Cockpit Sound Quality and Pilot Situational Awareness

The quality of sound in the cockpit, be it from radios, intercom, warning signals, or others sources, has been a much neglected area for many years. The following systems, developed and introduced by Terma, can truthfully be described as a revolution in cockpit sound quality:

- 3D-Audio Warning which gives the pilot real-time audio warnings from the exact direction of attack. The result is a considerable reduction in reaction time and enhanced situational awareness.
- Active Noise Reduction and Electrical Noise Reduction, which reduce pilot stress and fatigue considerably.
- Radio channel separation, which improves intelligibility and overall safety because important messages are not lost in simultaneous transmissions.
- Directional intercom, which improves communication, mutual understanding, and awareness among crew members.

The improvement of sound quality is largely due to introduction of a digital stereo intercom system supported by an Enhanced Intercom Amplifier, EIA. The systems can be installed as stand-alone or as an integral part of the AN/ALQ-213(V) EW Management System on all types and sizes of aircraft.

Matured Decision Support and High Fidelity Embedded Training as Part of the AN/ALQ-213(V) System

ELECTRONIC COMBAT ADAPTIVE PROCESSING, ECAP

For the EW Management Unit, EWMU, to provide meaningful semi-automatic and automatic operation, any automation needs to match very carefully tactics applicable to the specific type of aircraft. Since 2004, Terma, together with EW national specialists, has been creating a decision support solution called Electronic Combat Adaptive Processing, ECAP, as part of the ALQ-213 system. Within the same time frame, new EW sensor/countermeasures technology has also supported the need for enhanced coordination between sensors and countermeasures. Focus of the capability circles around optimized aircrew awareness of threat picture, optimized operation across the EW suite throughout all mission phases, and reduced pilot workload.

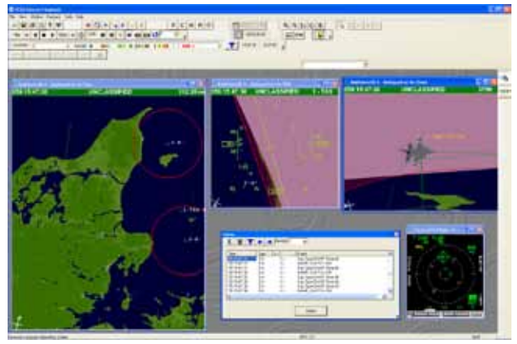
EMBEDDED TRAINING, ET

With the new decision support and improved EW subsystems capabilities, enabling end users to familiarize themselves with how to operate and get the best out of the EW suite in the context of "war", it was clear that this could not be achieved through traditional methods. For example, in-flight engagements against real threats (airborne missiles and full weapon systems) while training, are neither practicable nor possible. Therefore, Terma can provide "full EW subsystem simulation" for uninstalled EW subsystems and provide "virtual weapons systems" against which weapon tactics can be trained. This capability combination is known as Embedded Training, ET. The in-cockpit experience realism and the ability to gather lessons learned experience from the in-flight instrumentation during post mission training debrief have been the lead features for full acceptance by the pilot community.

EXTENSIVE TESTING IN DIFFERENT ENVIRONMENTS

ECAP and ET development has been an international project with the European F-16 users as partners, and multi-national evaluation testing has taken place at Leeuwarden, The Netherlands; Ørlandet, Norway; and Edwards Air Force Base, USA. The end result is a new set of in-flight tools that ensures that pilots will now be able to use the motto "We train as we fight", and that in case of attacks during real conflicts, they will have the best decision support possible.

Although ECAP and ET testing was carried out within the F-16 community, results are equally applicable to other types of aircraft equipped with the ALQ-213. In fact, the capabilities have been designed with core processing and mission data strategies, which means that tailoring and re-integration to other aircraft platforms are minimized. Transfer of these capabilities onto other platform types within the ALQ-213 user community has already been initiated.



POST MISSION PILOT DEBRIEF WITH EW: MULTI-PLAYER "BIG PICTURE" INTEGRATION OF TERMA'S EW INFORMATION (ATD AND EW EVENTS) INTO THE COMMON PC DEBRIEFING SYSTEM TRAINING TOOL.

COCKPIT INSTALLATION: THE ADVANCED THREAT DISPLAY MERGES ALL REAL EW INFORMATION WITH ECAP'S DECISION SUPPORT INFORMATION ALONG WITH EMBEDDED TRAINING'S VIRTUAL THREATS AND SIMULATED SUBSYSTEMS.

Aircraft Equipped with Terma EW Self-Protection Systems

HELICOPTERS

REFERENCE LIST
CH-47D, CH-47F
AS-532
HH-60G
EH-101
AH-64D
AS-550
Mi-17, Mi-24
NH-90

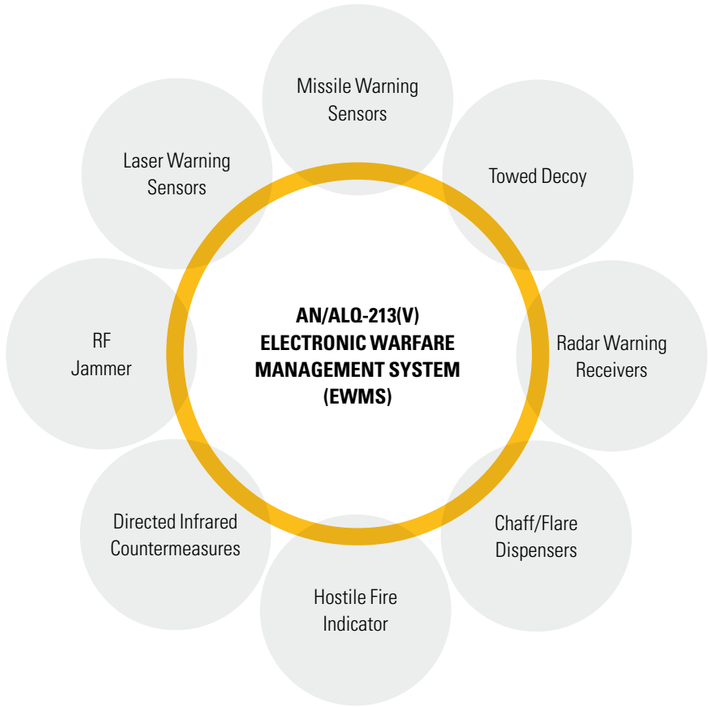
FIGHTERS

REFERENCE LIST
F-16A/B, F-16C/D
F-16 MLU, F-16 Blk 60
A-10 Thunderbolt
Tornado
Harrier
F-111C/G

TRANSPORTS / LARGER AIRCRAFT

REFERENCE LIST
C-160, Transall
C-130H-30, C-130H, C-130J
Fokker 27
Fokker 60
P-8A Poseidon
Nimrod
E-737AEW

EW Subsystems Currently Controlled by ALQ-213



Aircraft Equipped with Terma EW Self-Protection Systems

HELICOPTERS

MI-24

Cougar

Chinook D/F

EH-101

Apache

MI-17

FIGHTERS

F-16

F-111

A-10

Tornado

Harrier

F-16 Blk 60

TRANSPORTS / LARGER AIRCRAFT

C-160

C-130J

C-130H

Nimrod

Fokker 60

P-8A

Installation of Sensors and Countermeasures Systems

CH-47D/F Chinook

Chinook Aircraft Survivability Equipment, CHASE
Two pods, one on each side of the fuselage, are each equipped with three UV missile warning sensors and one DIRCM unit. This provides 360 deg spherical coverage against incoming IR missiles. Mounting of sensors and DIRCM in the same pod eliminates inaccuracies caused by fuselage torque during maneuvering.

CH-47D fuselage mounted dispense magazines

MI-17

MASE Pod for Mi-17
The helicopter carries two pods, each containing three UV missile warning sensors and two chaff/flare magazines, plus provisions for RWR, LWS, and HFI.

AH-64D Apache

Apache Modular Aircraft Survivability Equipment, AMASE
Each helicopter has two pods mounted on the stub wings. Each pod holds two chaff/flare magazines and three UV-based missile warning sensors providing 360 deg spherical coverage against incoming threats. Each AMASE pod can host a DIRCM unit, RWR, KWR, and HFI.

F-16

F-16 Pylon Integrated Dispensing System (PIDS+)
Each pylon contains three UV missile warning sensors and two chaff/flare magazines. Full weapons carrying capability is retained.

Tornado

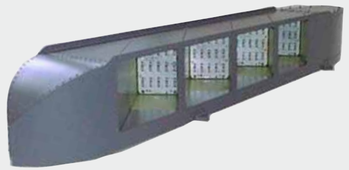
Modular Countermeasures Pod, MCP for Tornado aircraft
The pod contains six UV missile warning sensors and eight chaff/flare magazines.

C-160 Transall

On the C-160 Transall, sensors are installed in the fuselage. The chaff/flare capacity has been increased to a total of 36 magazines. Two underwing **Modular Countermeasures Pods, MCP-10** each contains ten magazines and two 'scab-on' mounted units each containing four magazines. The original eight fuselage mounted magazines are retained.

Modular Countermeasures Pod, MCP-10

'Scab-on' mounted dispense unit for the C-160. Each aircraft carries two units.

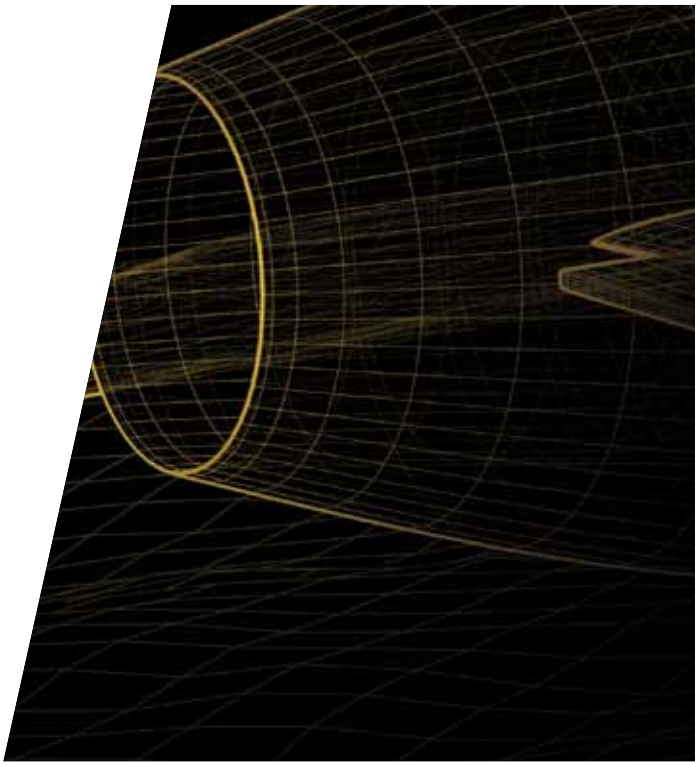


Operating in the aerospace, defense, and security sector, Terma supports customers and partners all over the world. With more than 1,100 committed employees globally, we develop and manufacture mission-critical products and solutions that meet exacting customer requirements.

At Terma, we believe in the premise that creating customer value is not just about strong engineering and manufacturing skills. It is also about being able to apply these skills in the context of our customers' specific needs. Only through close collaboration and dialog, can we deliver a level of partnership and integration unmatched in the industry.

Our business activities, products, and systems include: command and control systems; radar systems; self-protection systems for ships and aircraft; space technology; and advanced aerostructures for the aircraft industry.

Headquartered in Aarhus, Denmark, Terma has subsidiaries and operations in The Netherlands, Germany, Singapore as well as a wholly-owned U.S. subsidiary, Terma North America Inc. Terma North America Inc. is headquartered in Arlington in the Washington D.C. area, with other offices in Georgia, Texas, Alabama, and Virginia.



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